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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/614,113	07/12/2000	Pai-Hung Pan	2915.3US (96-0149.2)	1710

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04/08/2003

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EXAMINER

DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 04/08/2003

19

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/614,113

Applicant(s)

PAN ET AL.

Examiner

DuyVu n Deo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17-22 is/are allowed.
- 6) ☒ Claim(s) 1-5 and 8-16 is/are rejected.
- 7) ☒ Claim(s) 6 and 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 17.
- ☐ Interview Summary (PTO-413) Paper No(s). _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other:

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 8-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Segawa et al. (US 5, 428,244) in view of Chang (US 5,438,006) and further in view of Possin et al. (US 4,704,783).

Segawa discloses a method of manufacturing a semiconductor device having a silicon rich dielectric layer. A silicon substrate is provided. A gate silicon dielectric layer composed of SiO₂ is grown over the silicon substrate. A polysilicon layer is formed on the surface of the gate dielectric layer. Ions of gate impurities are implanted into the polysilicon layer. A tungsten silicide layer is deposited on the surface on the polysilicon layer. This reads on the applicant's limitation of depositing a metallic silicide film in non-annealed state atop the polysilicon layer. A silicon oxide layer, a dielectric cap layer, is formed on the surface of the polysilicon layer by means of a CVD process (Column 7, lines 7-24). The silicon oxide film is deposited at a temperature of 840°C. Patterns are formed upon the dielectric cap layer. Upon the completion of

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DETAILED ACTION

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Segawa et al. (US 5,428,244) in view of Chang (US 5,438,006) and further in view of Possin et al. (US 4,704,783).

Segawa discloses a method of manufacturing a semiconductor device having a silicon rich dielectric layer. A silicon substrate is provided. A gate silicon dielectric layer composed of SiO₂ is grown over the silicon substrate. A polysilicon layer is formed on the surface of the gate dielectric layer. Ions of gate impurities are implanted into the polysilicon layer. A tungsten silicide layer is deposited on the surface on the polysilicon layer. This reads on the applicant's limitation of depositing a metallic silicide film in non-annealed state atop the polysilicon layer. A silicon oxide layer, a dielectric cap layer, is formed on the surface of the polysilicon layer by means of a CVD process (Column 7, lines 7-24). The silicon oxide film is deposited at a temperature of 840°C. Patterns are formed upon the dielectric cap layer. Upon the completion of

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the transferring of patterns, the polysilicon layer, the tungsten silicide film, and the silicon oxide layer are etched sequentially (Column 7, lines 49-52). In one example of the invention, the tungsten silicide layer and the silicon oxide layer are formed from SH_2CL_2 gas. The tungsten silicide layer is formed at a temperature from 500°C to 600°C . The SH_2CL_2 gas is introduced in the chamber not only at the step of forming the tungsten silicide but also at the step of forming the silicon oxide layer (Column 13, lines 51-53). Since both the silicon oxide layer and tungsten silicide layer are formed from the SH_2CL_2 gas, the two layers have the same deposition temperature (Column 14, lines 5-8). This reads on the applicant's limitation of forming the cap dielectric layer over the metallic silicide film at a temperature below about 600°C .

Unlike the claimed invention, Segawa does not teach a method of stripping a resist layer.

Chang teaches a method for fabrication a reduced-height gate stack. A gate oxide layer and a surrounding field oxide layer is formed over a semiconductor substrate. The field oxide layer provides isolation between adjacent transistors. A layer of doped silicon is formed over the oxide layers. A refractory metal layer such as tungsten silicide is formed over the polysilicon layer. A silicon dioxide layer is formed over the metal layer. A layer of photoresist is formed over the oxide layer. The photoresist layer is patterned to form photoresist masks. The photoresist masks are removed in a conventional manner (Column 2, lines 24-45). This reads on the applicant's limitation of stripping the photoresist layer.

It is the Examiner's position that a person having ordinary skill in the art would have found it obvious to modify Segawa by using the method of stripping the resist as taught by

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Chang. The additional step of stripping the resist would have been expected in order to form a gate stack over the semiconductor substrate.

Unlike the claimed invention, neither Segawa nor Chang teach a method of depositing a dielectric cap layer at a temperature below about 600°C.

Possin teaches a method for fabricating a field effect transistor. A passivating cap layer is provided over a substrate. The cap comprises silicon nitride which is deposited by plasma chemical vapor deposition at a temperature of approximately 150°C (Column 4, lines 1-17).

It is the Examiner's position that a person having ordinary skill in the art would have found it obvious to modify Segawa and Chang with the method of depositing a dielectric cap layer below 600°C as taught by Possin in order to effectively deposit the silicon nitride layer by plasma chemical vapor deposition (Column 4, lines 10-13).

Response to Arguments

3. Applicant's argument that Segawa discloses the temperature of 650-700 degrees Celsius is acknowledged. However, differences in T will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such T is critical. Furthermore, the fact there is a range of T shows the T is a result-effective variable, which would have to be determined through routine experimentation. See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Allowable Subject Matter

4. Claims 6,7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 6, 7 are allowable because prior art doesn't describe depositing the dielectric cap over the metallic film is effected at a T sufficiently low to maintain the metallic silicide film in the non-annealed state or to preclude formation of silicon clusters in the metallic silicide film.

Claims 17-22 are allowed because prior art doesn't describe depositing the dielectric cap over the metallic film is effected at a T sufficiently low to maintain the metallic silicide film in the non-annealed state

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
April 7, 2003


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